

Patent Claims

1. Electronic display and control device for a
geodetic measuring device (12, 12') which has a
5 radiation source (8) for emission of a visible or
invisible radiation beam (S) for carrying out a
measuring process,
- comprising electronic display means (3) for
10 visual display of a measuring range (9)
acquired by recording means (1, 1'),
- comprising input means (4) for inputting data
and for controlling the recording means (1, 1')
15 and the measuring process,
- at least one position mark (3a), preferably a
crosshair, being provided by the display means
(3), and
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- the fixing of a measuring point for three-
dimensional surveying being determined by
positioning of the position mark (3a),
- 25 characterized in that
- alignment means (9, 9', 9'') are present which
permit variable alignment of the emission
direction of the radiation beam (S) relative to
30 the orientation of the recording means (1, 1'),
alignment means (9, 9', 9'') and recording means
(1, 1') being designed and arranged so that the
radiation beam (S) is coordinated at least partly

with at least one optical component (6) of the recording means (1, 1'), in particular is emitted by means of this component (6).

- 5 2. Electronic display and control device according to Claim 1, characterized in that the alignment means (9, 9', 9'') are designed so that the alignment of the radiation beam (S) is effected in such a way that, in the display of the acquired measuring
10 range (11), the position (3c) of the radiation beam is made to coincide with the position mark (3a) so that the radiation beam (S) is utilized for carrying out the measuring process.
- 15 3. Electronic display and control device according to Claim 1 or 2, characterized in that the alignment means (9, 9', 9'') have at least one of the following means
- 20 - servo elements (9) for two-dimensional movement of the radiation source,
 - a rotatable and/or tiltable reflecting surface (9'),
 - a, preferably continuously, deformable reflecting surface,
 - 25 - a transmittive double wedge (9'') rotatable relative to one another.
- 30 4. Electronic display and control device according to any of the preceding Claims, characterized in that a calibration control device is present which has an image sensor (1e) which detects the emission direction of the radiation beam (S) so that detection of the emission direction of the

radiation beam (S) independently of the recording means (1, 1') takes place.

5. Electronic display and control device according to
5 any of the preceding Claims, characterized in that the display means (3) are designed so that display of the radiation beam (S) in the measuring range (11) is effected by at least one pixel displayed in a distinguishable manner, which is effected
10 either
- by calculation of the position of the radiation beam (S) in the measuring range (11) and electronic enhancement of the pixel coordinated with this position or
 - 15 - by direct optical imaging of the radiation within the recording means (1, 1').
6. Electronic display and control device according to
20 any of the preceding Claims, characterized in that the position mark (3a) can be positioned by the input means (4) within the visual display (3), preferably in discrete steps, in particular pixel by pixel.
- 25 7. Electronic display and control device according to any of the preceding Claims, characterized in that the input means (4) and/or display means (3) are designed so that, by the positioning of the position mark (3a), at least a part of the
30 measuring process is initiated, in particular
- the control of the recording means (1, 1') and/or
 - the control of the alignment means (9, 9'),

9'') is effected.

8. Electronic display and control device according to any of the preceding Claims, characterized in that the visual display of the acquired measuring range (11) or of parts of the measuring range (11) can be made smaller, can be made larger and/or can be changed in its resolution by the recording means (1, 1') and/or display means (3), in particular by a variation of the, preferably electronic, assignment of the data of pixels of the recording means (1, 1') to pixels of the display means (3).
9. Electronic display and control device according to any of the preceding Claims, characterized in that the recording means (1, 1') comprise at least one of the following means
- CCD camera,
 - CMOS camera,
 - video camera,
 - low light level amplifier,
 - thermal imaging camera,
 - spectrally selective detector,
 - spectral filter.
10. Electronic display and control device according to any of the preceding Claims, characterized in that the recording means have an autofocusing system (6') which is part of the objective or is positioned outside the objective in the beam path.
11. Electronic display and control device according to any of the preceding Claims, characterized in that

the display means (3) comprise at least one of the following means

- LCD display,
- cathode ray tube,
- 5 - flat screen,
- interface to communication networks,
- electronic computer with monitor, preferably portable laptop.

10 12. Electronic display and control device according to any of the preceding Claims, characterized in that the input means (4) comprise at least one of the following means

- touch-sensitive screen,
- 15 - touch-sensitive input field,
- keyboard field,
- joystick,
- trackball,
- computer mouse,
- 20 - interface to communication networks,
- electronic computer with input device, preferably a portable laptop.

25 13. Electronic display and control device according to any of the preceding Claims, characterized in that the electronic display means (3) and the input means (4) are combined in one component, preferably a touch-sensitive flat screen (2').

30 14. Electronic display and control device according to any of the preceding Claims, characterized in that recording means (1, 1') and alignment means (9, 9', 9'') are in the form of an independent module

and are connected to the other components via a wire connection (5) or a radio link.

15. Geodetic measuring device (12, 12'),
- 5
- comprising a radiation source (8) for emission of a visible or invisible radiation beam (S) for carrying out a measuring process,
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- comprising a receiving device (14) for acquiring radiation of the reflected radiation beam (S) and converting this radiation into signals,
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- comprising electronic evaluation means for evaluating the signals and
 - comprising an electronic display and control device according to any of Claims 1 to 14.
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16. Geodetic measuring device (12, 12') according to Claim 15, characterized by orientation means (10) for orienting the recording means (1, 1') relative to a measuring range (11).
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17. Geodetic measuring device (8, 8') according to Claim 16, characterized by further input means for controlling the orientation means (10).
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18. Geodetic measuring device (12, 12') according to any of Claims 15 to 17, characterized in that the electronic display and control device is designed so that, by positioning of the position mark (3a),

the determination of at least one parameter of the measuring process, in particular

- the fixing of a measuring point for three-dimensional surveying,
- the control of the recording means (1, 1'),
- the control of the alignment means (9, 9', 9'') and/or
- the control of the orientation means (10), is effected.

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19. Geodetic measuring device (12, 12') according to any of Claims 16 to 18, characterized in that the radiation source (8) and the receiving device (14) are arranged on a movable support element (15, 15', 15'').

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20. Geodetic measuring device (12, 12') according to any of Claims 16 to 19, characterized in that radiation source (8), receiving device (14) and alignment means (9, 9', 9'') are formed and arranged in such a way that both radiation emitted by the radiation source (8) and radiation to be received by the receiving device (14) are guided via the alignment means (9, 9', 9''), in particular a transmittive double wedge (9'') rotatable relative to one another.

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21. Geodetic measuring device (12, 12') according to any of Claims 16 to 20, characterized in that the orientation means have a device, in particular attachable device, for alignment of the geodetic measuring device (12, 12') relative to a reference

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point, preferably a triangulation point, in particular in association with a movement of the recording means (1, 1') from the orientation necessary for acquisition of the measuring range (11) into an orientation for detection of the reference point.

22. Geodetic measuring device (12, 12') according to any of Claims 15 to 21, characterized in that the input means (4) and/or the display means (3) are mounted so as to be movable independently of an alignment of the geodetic measuring device (12, 12'), in particular pivotable about a horizontal axis (A).

23. Module component for a geodetic surveying system, comprising

- integrated input means and/or display means (3) of a geodetic measuring device (12, 12') according to any of Claims 15 to 22, and
- means for establishing a wire connection (5) or a radio link to the geodetic measuring device (12, 12') and optionally to at least one further geodetic measuring device (12, 12').

24. Geodetic surveying system,

- comprising at least two geodetic measuring devices (12, 12') according to any of Claims 15 to 22 and
- comprising at least one module component according to Claim 23,

the at least one module component being in the form of common input means and/or common display

means (3) for the at least two geodetic measuring devices (12, 12'), optionally with alternate use thereof.